WHAT IS CLAIMED IS:

1. A method of forming a sputtering target assembly comprising a backing member and a target member, comprising:

positioning a member having a bonding side with a plurality of projections, and a member having a bonding side with a plurality of grooves adapted to receive said projections, whereby said projections and said grooves are in substantial registration, and wherein an interface is defined by said bonding surfaces;

slidably contacting a portion of at least one projection with a portion of at least one groove; and

partially deforming said at least one projection to at least partially fill said at least one groove, thereby forming at least a mechanical bond between the target member and the backing member, wherein said member having said grooves is a metal having a melting point higher than that of the metal which comprises the projections.

2. The method of claim 1, wherein said member having said projections is said target member and said member having said grooves is said backing member.

3. The method of claim 1, wherein said member having said projections is said backing member and said member having said grooves is said target member.

4. The method of claim 1, wherein said member having said grooves comprises cobalt, titanium, copper, aluminum, tantalum, niobium, nickel, molybdenum, zirconium, hafnium, gold, silver or alloys thereof.

5. The method of claim 1, wherein said member having said grooves comprises tantalum or alloys thereof.

6. The method of claim 1, wherein said member having said grooves comprises niobium or alloys thereof.

7. The method of claim 1, wherein said member having said projections comprises cobalt, titanium, copper, aluminum, tantalum, niobium, or alloys thereof.

8. The method of claim 1, wherein said member having said projections comprises a copper-chromium or copper-zinc alloy.

9. The method of claim 1, wherein said projections are of irregular shape.

10. The method of claim 1, wherein said projections are substantially cylinders, cones, truncated cones, cubes, cuboids, pyramids, obelisks, or wedges, or combinations thereof.

11. The method of claim 1, wherein said grooves are substantially in the shape of a square, rectangle, "T", "L", semicircle, truncated triangle, cusp, or a bowtie.

12. The method of claim 1, wherein said bond is formed such that a portion of the bonding side of said target member contacts at least a portion of the bonding side of said backing member.

13. The method of claim 1, wherein said bond is formed such that a gap is formed between at least a portion of the bonding side of the target member and a portion of the bonding side of said backing member.

14. The method of claim 1, wherein at least one groove has a shape that is different from a shape of at least one other groove.

15. The method of claim 1, wherein at least one projection has a shape that is different from a shape of at least one other projection.

16. The method of claim 1, wherein at least one groove has a volume that is different from a volume of at least one other groove.

17. The method of claim 1, wherein at least one projection has a volume that is different from a volume of at least one other projection.

18. The method of claim 1, wherein slidably contacting comprises rotating said member having said projections relative to said member having said grooves or vice versa, and applying a force to said member having said projections, said member having said grooves, or both members, in a direction of said interface.

19. The method of claim 18, wherein said rotating is at a rotational speed of from about 500 to about 2000 surface-ft/min.

20. The method of claim 18, wherein said force is a joining force of from about 10,000 to about 18,000 p.s.i.

21. The method of claim 18, wherein said mechanical bond is achieved by a rotational energy of from about 60 to about 190 ft-lb/in^2.

22. The method of claim 18, wherein said rotating is at a rotational speed of from about 500 to about 2000 rpm.

23. The method of claim 1, wherein slidably contacting comprises rotating said members relative to each other and applying a force to said member having said grooves, said member having said projections, or both members, in a direction of said interface.

24. The method of claim 23, wherein said rotating is at a rotational speed of from about 500 to about 2000 surface-ft/min.

25. The method of claim 23, wherein said force is a joining force of from about 10,000 to about 18,000 p.s.i.

26. The method of claim 23, wherein said mechanical bond is achieved by a rotational energy of from about 60 to about 190 ft-lb/in^2.

27. The method of claim 23, wherein said rotating is at a rotational speed of from about 500 to about 2000 rpm.

28. The method of claim 1, wherein a friction welding machine is used to

slidably contact said portions.

29. The method of claim 1, wherein said bond comprises an interlocking bond and/or mechanical joint.

30. The method of claim 1, further comprising disposing a solder metal or alloy, braze metal or alloy, or combination thereof on at least a portion of said at least one projection.

31. The method of claim 1, further comprising disposing a solder metal or alloy, braze metal or alloy, or combination thereof on at least a portion of the bonding side of said member having said projections.

32. The method of claim 1, further comprising disposing a solder metal or alloy or braze metal or alloy, or combination thereof on at least a portion of said at least one groove.

33. The method of claim 1, further comprising disposing a solder metal or alloy or braze metal or alloy, or combination thereof on at least a portion of the bonding side of said member having said grooves.

34. The method of claim 1, further comprising forming a cell member having a plurality of sides, wherein said cell member is formed proximate to said interface.

35. The method of claim 34, wherein at least one of said sides comprises a portion of the bonding side of said member having said grooves.

36. The method of claim 34, further comprising disposing a gas in said cell member.

37. The method of claim 36, wherein said gas comprises argon.

38. The method of claim 36, wherein a pressure of said gas in said cell member is about 1 atmosphere.

39. The method of claim 1, wherein forming said sputtering target assembly is under a cover gas.

40. The method of claim 39, wherein said cover gas comprises an inert gas.

41. The method of claim 40, wherein said inert gas comprises argon.

42. The method of claim 39, wherein said cover gas is doped with interstitial hardening agents such as oxygen or nitrogen.

43. A sputtering target assembly, comprising:

a member having a bonding side with a plurality of projections; and

a member having a bonding side with a plurality of grooves, wherein said member having said grooves is a metal having a melting point higher than that of the metal which comprises said projections, and wherein at least one groove is substantially filled by at least one projection such that said members are at least mechanically bonded together.

44. The sputtering target assembly of claim 43, wherein said member having said grooves is a target and said member having said projections is a backing plate.

45. The sputtering target assembly of claim 43, wherein said member having said grooves is a backing plate and said member having said projections is a target.

46. The sputtering target assembly of claim 43, wherein a gap exists between a portion of said bonding sides.

47. The sputtering target assembly of claim 46, wherein a width of said gap is from about 0.001 inch to about 0.1 inch.

48. The sputtering target assembly of claim 47, wherein a portion of said bonding sides are in contact.

49. The sputtering target assembly of claim 43, further comprising at least one cell member proximate to an interface defined by a portion of said bonding sides.

50. The sputtering target assembly of claim 49, wherein said cell member contains a gas at pressure of about 0.1 atmosphere to about 5 atmospheres.

51. The sputtering target assembly of claim 43, wherein said members are bonded or joined by an interlocking bond and/or mechanical joint.

52. The sputtering target assembly of claim 43, further comprising a solder alloy or solder metal or braze alloy or metal disposed on at least a portion of said projections.

53. The sputtering target assembly of claim 43, further comprising a solder alloy or metal or braze alloy or metal disposed on at least a portion of said grooves.

54. The sputtering target assembly of claim 43, further comprising a solder alloy or metal or braze alloy or metal disposed on at least a portion of said bonding side of said member having said projections.

55. The sputtering target assembly of claim 43, further comprising a solder alloy or metal or braze alloy or metal disposed on at least a portion of said bonding side of said member having said grooves.

56. The sputtering target assembly of claim 43, wherein said member having said grooves comprises cobalt, titanium, copper, aluminum, tantalum, niobium, nickel, zirconium, hafnium, silver, gold or alloys thereof.

57. The sputtering target assembly of claim 43, wherein said member having said grooves comprises tantalum or alloys thereof.

58. The sputtering target assembly of claim 43, wherein said member having said grooves comprises niobium or alloys thereof.

59. The sputtering target assembly of claim 43, wherein said member having said projections comprises cobalt, titanium, copper, aluminum, tantalum, niobium, nickel, zirconium, hafnium, silver, gold, molybdenum or alloys thereof.

60. The sputtering target assembly of claim 43, wherein said member having said projections comprises a copper-chromium or copper-zinc alloy.

61. The sputtering target assembly of claim 43, wherein said projections are of irregular shape.

62. The sputtering target assembly of claim 43, wherein said projections are substantially cylinders, cones, truncated cones, cubes, cuboids, pyramids, obelisks, or wedges, or combinations thereof.

63. The sputtering target assembly of claim 43, wherein said grooves are substantially in the shape of a square, rectangle, "T", "L", semicircle, truncated triangle, cusp, or a bowtie.